
MONTANA DEPARTMENT OF TRANSPORTATION WETLAND MITIGATION MONITORING REPORT: YEAR 2001

*Wigeon Reservoir
Alzada, Montana*



Prepared for:

MONTANA DEPARTMENT OF TRANSPORTATION
2701 Prospect Avenue
Helena, MT 59620-1001

Prepared by:

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Bozeman, MT 59771

Compiled and Edited by:

LAND & WATER CONSULTING, INC.
P.O. Box 8254
Missoula, MT 59807

July 2002

Project No: 130091.028



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Appendix B:	<i>Completed 2001 Wetland Mitigation Site Monitoring Form</i> <i>Completed 2001 Bird Survey Forms</i> <i>Completed 2001 Wetland Delineation Forms</i> <i>Completed 2001 Field and Functional Assessment Forms</i> <i>Completed 2001 Macroinvertebrate Sampling Results</i>
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1.0 INTRODUCTION

The Wigeon wetland was created to provide mitigation credits for wetland impacts associated with Montana Department of Transportation (MDT) roadway projects that have either been constructed or will be constructed in Watershed #16 in MDT District Five. The site is located in Carter County, Montana, approximately 22 miles directly north of Alzada (**Figure 1**) in Sections 23 and 26, Township 5 South, Range 59 East. Elevations range from approximately 3,169 to 3,175 feet above sea level.

Construction was completed on this site in October of 1997 with the goal of creating a reservoir to provide nesting and brood rearing habitat for waterfowl and other wildlife species. An impoundment was constructed to collect surface water runoff from an intermittent tributary of Prairie Dog Creek. The site boundary is illustrated on **Figure 2, Appendix A**.

This wetland was designed by the BLM in association with the MDT to provide specific wetland functions including: nesting and brood rearing habitat for waterfowl; water for wildlife habitat; increased habitat diversity; water storage and retention; and creating open water and emergent wetland types.

2.0 METHODS

2.1 Monitoring Dates and Activities

The site was visited once on August 22, 2001. All information contained within the Wetland Mitigation Site Monitoring Form (**Appendix B**) and macroinvertebrate samples were collected at this time. Activities and information conducted/collected included: wetland delineation; wetland/open water boundary mapping; vegetation community mapping; vegetation transects; soils data; hydrology data; bird and general wildlife use; photograph points; macroinvertebrate sampling; GPS data points; functional assessment; and, assess maintenance needs of any bird nesting structures and inflow and outflow structures.

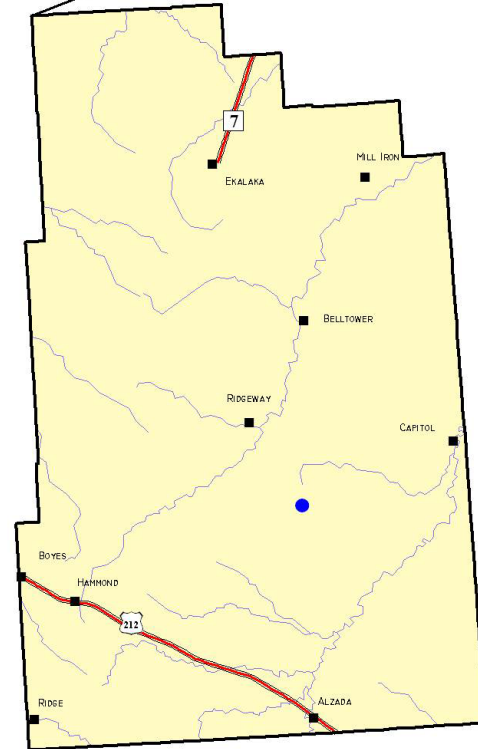
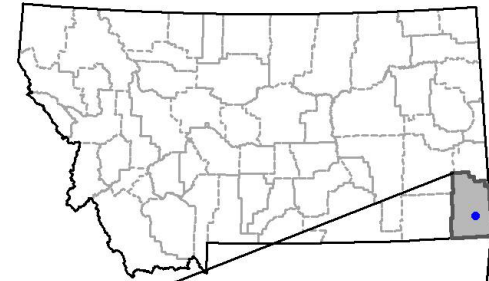
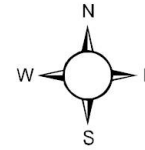
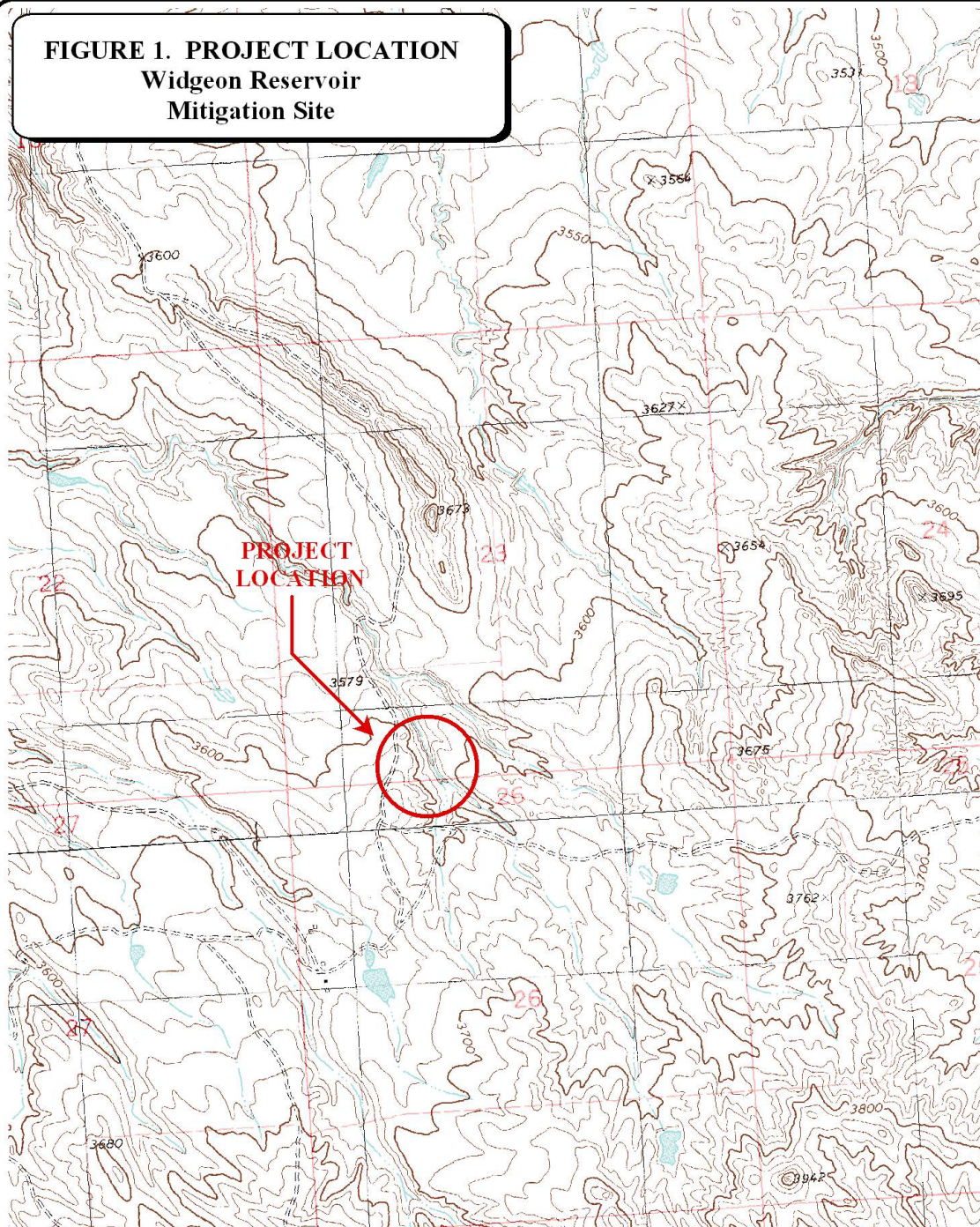
2.2 Hydrology

Wetland hydrology indicators were recorded using procedures outlined in the US Army Corps' (COE) 1987 Wetland Delineation Manual. Hydrology data were recorded on the Routine Wetland Delineation Data Form (**Appendix B**) at each wetland determination point.

All additional hydrologic data were recorded on the mitigation site monitoring form (**Appendix B**). The boundary between emergent vegetation and deep water was mapped on the aerial photograph (**Figure 3, Appendix A**).

There are no groundwater monitoring wells at the site. Hydrologic runoff curves and peak discharges were estimated prior to spillway construction. These calculations are included in **Appendix C**. There is no inflow structure and the dike has no outflow control structure.

FIGURE 1. PROJECT LOCATION
Widgeon Reservoir
Mitigation Site



800 0 800 1600 FEET
 I: 24,000

PROJECT #: 130091.028
 DATE: APRIL 2001
 LOCATION:
 PROJECT MANAGER: B. DUTTON
 DRAWN BY: B. NOECKER

LAND & WATER CONSULTING, INC.

1120 CEDAR PO BOX 8254 MISSOULA, MT 59807

2.3 Vegetation

General vegetation types were delineated on an aerial photograph during the August site visit (**Figure 3, Appendix A**). Coverage of the dominant species in each community type is listed on the monitoring form (**Appendix B**). A comprehensive plant species list for the entire site was compiled and will be updated as new species are encountered. Observations from past years will be compared with new data to document vegetation changes over time. Wigeon Reservoir is not fenced, and cattle have unrestricted access to the site; a dead cow carcass was noted beside the reservoir during the site visit (**Appendix C**). Woody species were not planted on this site.

One transect was established during the 2001 monitoring event to represent the range of current vegetation conditions. The location of this transect is shown on **Figure 2, Appendix A**. Percent cover for each species was recorded on the vegetation transect form (**Appendix B**). The transect will be used to evaluate changes over time, especially the establishment and increase of hydrophytic vegetation. Transect ends were marked with metal fence posts and their locations recorded with the GPS unit. Photographs of the transect were taken from both ends during the site visit.

2.4 Soils

Soils were evaluated during the site visit according to the procedure outlined in the COE 1987 Wetland Delineation Manual. Soil data were recorded for each wetland determination point on the COE Routine Wetland Delineation Data Form (**Appendix B**).

2.5 Wetland Delineation

A wetland delineation was conducted within the area immediately adjacent to and including the reservoir according to the 1987 COE Wetland Delineation Manual. Wetland and upland areas within the monitoring area were investigated for the presence of wetland hydrology, hydrophytic vegetation and hydric soils. The indicator status of vegetation was derived from the National List of Plant Species that Occur in Wetlands: North Plains Region 4 (Reed 1988). The information was recorded on the COE Routine Wetland Delineation Forms (**Appendix B**). The wetland/upland and open water boundaries were used to calculate the wetland area developed at the reservoir.

2.6 Mammals, Reptiles, and Amphibians

Mammal, reptile, and amphibian species observations were recorded on the wetland monitoring form during the site visit (**Appendix B**). Indirect use indicators were also recorded including tracks, scat and burrows. A comprehensive wildlife species list for the entire site was compiled and will be updated as new species are encountered. Observations from past years will be compared with new data to determine if wildlife use is changing over time.

2.7 Birds

Bird observations were recorded during the site visit according to the established bird survey protocol (**Appendix D**). A general, qualitative bird list has been compiled using these observations. Observations will be compared between years in future studies.

2.8 Macroinvertebrates

One macroinvertebrate sample was collected during the site visit following the 2001 protocol (**Appendix D**). Samples were preserved as outlined in the sampling procedure and sent to a laboratory for analysis. The approximate sampling location is indicated on **Figure 2, Appendix A**.

2.9 Functional Assessment

A functional assessment form was completed in 2001 for the Wigeon reservoir using the 1999 MDT Montana Wetland Assessment Method. Field data necessary for this assessment were collected on a condensed data sheet included in the mitigation site monitoring form. The remainder of the assessment was completed in the office (**Appendix B**).

2.10 Photographs

Photographs were taken showing the current land use surrounding the site, the wetland buffer, the monitored area, and the vegetation transect. A description and compass direction for each photograph were recorded on the wetland monitoring form.

During the 2001 monitoring season, each photograph point was marked on the ground with a wooden stake and the location recorded with a resource grade GPS. The approximate locations are shown on **Figure 2, Appendix A**. All photographs were taken using a 50 mm lens.

2.11 GPS Data

During the 2001 monitoring season, survey points were collected using a resource grade Trimble, Geoexplorer III hand-held GPS unit. Points collected included: the vegetation transect beginning and ending locations; photograph locations; and the jurisdictional wetland boundary. In addition, during the August 2001 monitoring season survey points were collected at four (4) landmarks recognizable on the air photo for purposes of line fitting to the topography.

2.12 Maintenance Needs

There are no inflow or outflow structures or nest boxes at this site. The only hydrologic control structure at the Wigeon wetland is the dike; no pipes or other outflow structures were installed to convey water through the dike or out of the reservoir.

3.0 RESULTS

3.1 Hydrology

Wigeon reservoir was completely inundated during the site visit. The water depth at the emergent vegetation/open water boundary was approximately 1 foot deep. Water depths were estimated to range between 1 and 6 feet deep throughout the reservoir. The open water boundary is depicted on **Figure 3, Appendix A**. The source of hydrology is an intermittent tributary of Prairie Dog Creek. No problems with the dike were noted.

According to the Western Regional Climate Center, Broadus yearly precipitation totals for 2000 (11 inches) and 2001 (11.4 inches) were 82 and 85 percent, respectively, of the total annual mean precipitation (13.4 inches) in this area.

3.2 Vegetation

Vegetation species identified on the site are presented in **Table 1** and in the monitoring form (**Appendix B**). Three (3) major vegetation communities were mapped on the mitigation area map (**Figure 3, Appendix A**). The communities include: Type 1, *Bouteloua gracilis*; Type 2, *Phleum pratense*; and Type 3, *Typha latifolia*. Dominant species within each community are listed on the monitoring form (**Appendix B**).

The drainages on the south and east ends of the reservoir, and an area on the east end of the dike, have developed the *Typha* (cattail) community. The circumference of the ponded area and beyond the *Typha* communities is the upland *Phleum* community; the entire area is surrounded by the dry, upland *Bouteloua* vegetation type.

Table 1: 2001 Wigeon Reservoir Vegetation Species List

Scientific Name	Common Name	Indicator Status
<i>Agropyron cristatum</i>	crested wheatgrass	NI (in UPL*)
<i>Agropyron dasystachyum</i>	thick-spike wheatgrass	FAC (in UPL*)
<i>Artemesia tridentata</i>	big sage	NI (in UPL*)
<i>Bouteloua gracilis</i>	blue gramma grass	NI (in UPL*)
<i>Carex spp.</i>	sedge	FAC-OBL
<i>Carex utriculata</i>	beaked sedge	OBL
<i>Festuca idahoensis</i>	Idaho fescue	NI (in UPL*)
<i>Grindelia gracilifolia</i>	gumweed	FACW
<i>Hordeum jubatum</i>	fox-tail barley	FACW
<i>Juncus spp.</i>	rush	FAC-OBL
<i>Phleum pratense</i>	timothy grass	FACU
<i>Typha latifolia</i>	cattail	OBL

* Species observed in upland areas.

The vegetation transect results are detailed in the monitoring form (**Appendix B**) and are summarized below.

Transect 1 Start	Upland Type 1 (20')	Upland Type 2 (25')	Wetland Type 3 (15')	Total 60'	End Transect 1
---------------------	------------------------	------------------------	-------------------------	--------------	-------------------

3.3 Soils

The site was mapped as part of the Carter County Soil Survey. The dominant soil on the site is the Moyerson-Orinoco complex (277D) a silty clay loam, and the Gerdrum-Absher (165C) complex (Typic Natriboralfs). The taxonomic classification of the 277D series components are, Ustic Torriorthent and Ardic Ustorthent, respectively.

The Moyerson-Orinoco (277D) is typical of sedimentary plains and hills and the Gerdrum-Absher complex (165C) is found in alluvial fans and stream terraces. Neither of these soil series are hydric or have hydric inclusions. Both soils types are poor for wetland plant establishment and have a high saline content.

A soil pit (SP-1) excavated within the *Bouteloua* (upland) vegetation community revealed a reddish gray (5YR 5/2) silty clay loam from 0 to 18 inches. The soil pit (SP-2) within the *Typha* (wetland) community revealed a gray (7.5 YR 5/1) clay loam, with distinct, red (10 R 4/8) mottles from 0 to 3 inches, and very dark gray (7.5 YR 3/1) from 3 to 18 inches with many, distinct, red mottles throughout the depth.

3.4 Wetland Delineation

The delineated wetland boundary is depicted on **Figure 3, Appendix A**. The COE data forms are included in **Appendix B**.

The 8.2-acre gross aquatic area boundary encompasses 2.75 acres of wetland and 5.45 acres of open water (estimated 1-6 feet depth). Credit should be considered for the shallow water habitat which is admittedly difficult to quantify in terms of “wetland” credit, but which does provide a valuable aquatic resource in this arid region of the state.

3.5 Wildlife

Wildlife species are listed in **Table 2**. Activities and densities associated with these observations are included on the monitoring form in **Appendix B**. Leopard frogs, a “species of special concern” (S3) by the Montana Natural Heritage Program (MNHP) were the most notable species observed. The frog is not listed as endangered; however, this reservoir could provide important habitat for revitalizing the species. Cattle access could be restricted via fencing to optimize the aquatic habitat for this species of special concern.

Table 2. Fish and Wildlife Species Observed on the Wigeon Reservoir Mitigation Site

AMPHIBIANS
Leopard frogs (<i>Rana pipiens</i>) ¹
BIRDS
Blue-winged teal (<i>Anas discors</i>) Killdeer (<i>Charadrius vociferous</i>) Mallards (<i>Anas platyrhynchos</i>) Meadow lark (<i>Sturnella neglecta</i>) Spotted sandpiper (<i>Actitis macularia</i>) Ruddy Duck (<i>Oxyura jamaicensis</i>)
MAMMALS
Cattle Deer (<i>Odocoileus spp.</i>) Raccoon (<i>Procyon lotor</i>)

¹Species of Special Concern by MNHP

3.6 Macroinvertebrates

The macroinvertebrate sampling results are included in **Appendix B**. Rhithron, Inc. summarized the results as stated below.

Near-optimal biologic conditions are implied by the bio-assessment scores calculated for this site. High taxa richness and a diverse midge fauna suggest good habitat availability. The elevated biotic index value suggests mild water quality impairment, perhaps by warm temperatures or nutrients; the impairment is probably mild, however, since two mayfly taxa were present in the sample (Rhithron, Inc.).

3.7 Functional Assessment

Completed functional assessment forms are included in **Appendix B** and summarized below in **Table 3**. The wetland ranks as a Category II wetland due to the presence of the MNHP species of special concern, the leopard frog. The wildlife habitat, in general, is still developing and received a moderate rating, while the sediment/nutrient/toxicant removal and sediment/shoreline stabilization, and flood attenuation attributes were also rated as moderate. The functional units totaled 57.4.

Table 3: Summary of 2001 Wetland Function/Value Ratings and Functional Points at the Wigeon Reservoir Mitigation Project

Function and Value Parameters From the 1999 MDT Montana Wetland Assessment Method	2001
Listed/Proposed T&E Species Habitat	Low (0)
MNHP Species Habitat	High (1)
General Wildlife Habitat	Moderate (.5)
General Fish/Aquatic Habitat	Moderate (.6)
Flood Attenuation	Moderate (.5)
Short and Long Term Surface Water Storage	High (1)
Sediment, Nutrient, Toxicant Removal	Moderate (.7)
Sediment/Shoreline Stabilization	Moderate (.7)
Production Export/Food Chain Support	Moderate (.6)
Groundwater Discharge/ Recharge	High (1)
Uniqueness	Low (.3)
Recreation/Education Potential	Low (.1)
Actual Points/Possible Points	7/12
% of Possible Score Achieved	58%
Overall Category	II
Total Acreage of Assessed Wetlands within Easement	8.2 ac
Functional Units (acreage x actual points)	57.4 fu
Net Acreage Gain	8.2 ac
Net Functional Unit Gain	57.4 fu
Total Functional Unit "Gain"	57.4 fu

3.8 Photographs

Representative photos taken from photo points and transect ends are included in **Appendix C**.

3.9 Maintenance Needs/Recommendations

No observable problems were noted concerning the dike structure.

3.10 Current Credit Summary

The 8.2-acre gross aquatic area boundary encompasses 2.75 acres of wetland and 5.45 acres of open water (estimated 1-6 feet depth). Though the reservoir depth is estimated to be less than 6 feet deep, the vegetation boundary occurs at 1 foot deep. It is likely that hydrophytic vegetation will spread into deeper waters.

Credit should be considered for the 5.45 acres of shallow water habitat which is admittedly difficult to quantify in terms of "wetland" credit, but which does provide a valuable aquatic resource in this arid region of the state.

The wetland ranks as a Category II wetland due to the presence of the MNHP species of special concern, the leopard frog. The wildlife habitat, in general, is still developing and received a moderate rating, while the sediment/nutrient/toxicant removal, sediment/shoreline stabilization, and flood attenuation attributes were also rated as moderate. The functional units totaled 57.4.

4.0 REFERENCES

- Berglund, J. 1999. *MDT Montana Wetland Assessment Method*. Prepared for Montana Department of Transportation. May 1999.
- Montana Dept. of Transportation. 1996. *MDT Biological Resources Report: Alzada South*. Helena, MT.
- Reed, P.B. 1988. National list of plant species that occur in wetlands: North Plains (Region 4). Biological Report 88(26.4), May 1988. U.S. Fish and Wildlife Service. Washington, D.C.
- US Army Corps of Engineers. 1987. *Corps of Engineers Wetlands Delineation Manual*. US Army Corps. Washington, DC.
- USDA Natural Resource Conservation Service. *Soil Survey of Carter County Area, Montana*.

Appendix A

FIGURES 2 - 3

*MDT Wetland Mitigation Monitoring
Wigeon Reservoir
Alzada, Montana*

Figure 2 Monitoring Activity Locations



Legend

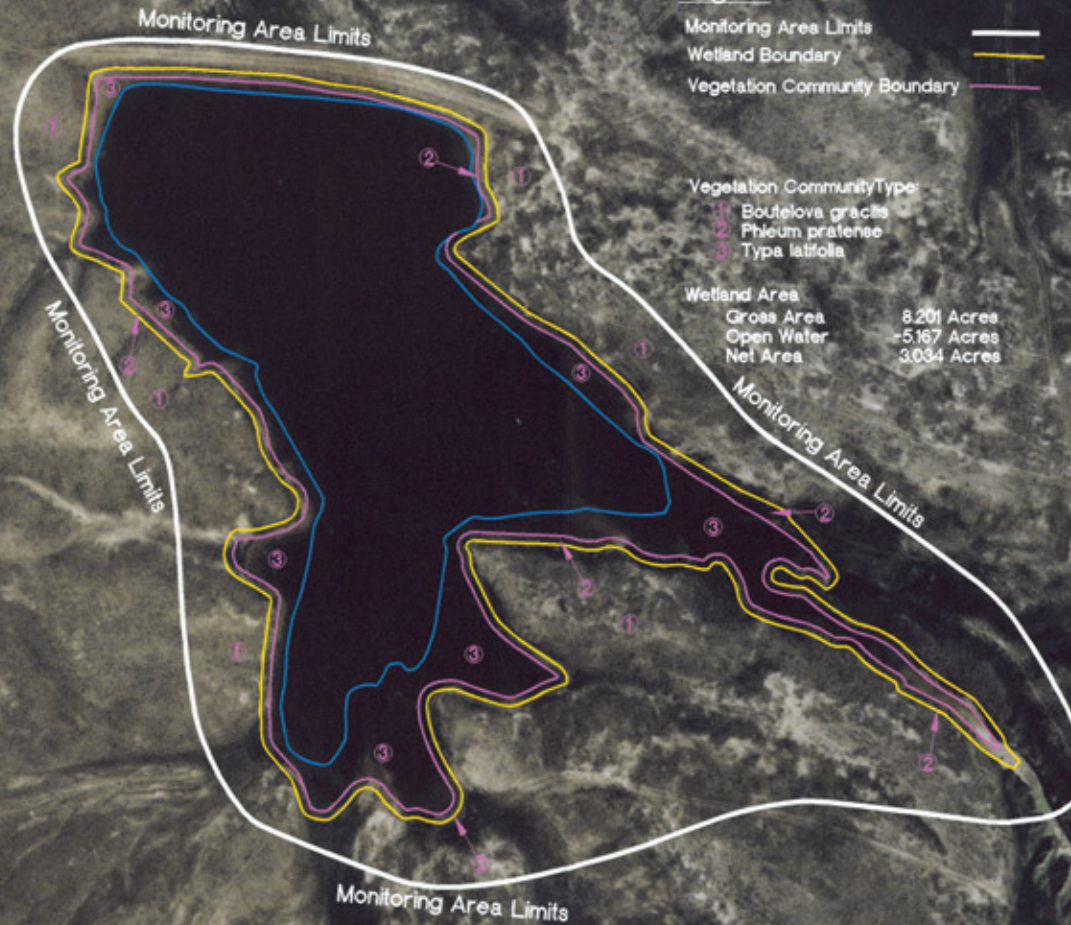
- Monitoring Area Limits
- Vegetation Transect
- Photograph Point
- Aerial Reference Point
- Soil Sample Point
- Macro-Invertebrate Sample

NOT TO SCALE

PROJECT NAME MDT Wigeon Reservoir Wetland Mitigation	DRAWN BA	PROJECT NO. 130091.028	SCALE 1"=150 ft	LOCATION Wigeon Reservoir	PROJECT NO. 130091.028	DRAWN BA	PROJECT NAME MDT Wigeon Reservoir Wetland Mitigation
DRAWING TITLE Monitoring Activity Locations	APPROVED BD	PROJECT NO. 130091.028	SCALE 1"=150 ft	LOCATION Wigeon Reservoir	PROJECT NO. 130091.028	DRAWN BA	PROJECT NAME MDT Wigeon Reservoir Wetland Mitigation
SHEET NUMBER 2	REV	PROJECT NO. 130091.028	SCALE 1"=150 ft	LOCATION Wigeon Reservoir	PROJECT NO. 130091.028	DRAWN BA	PROJECT NAME MDT Wigeon Reservoir Wetland Mitigation
DATE	DATE	PROJECT NO. 130091.028	SCALE 1"=150 ft	LOCATION Wigeon Reservoir	PROJECT NO. 130091.028	DRAWN BA	PROJECT NAME MDT Wigeon Reservoir Wetland Mitigation



Figure 3 Mapped Site Features



NOT TO SCALE

	PROJECT NAME		MDT Wigeon Reservoir Wetland Mitigation	
	DRAWING TITLE		Mapped Site Features	
PROJ NO. 130091.028 FILE NAME: TASC0808ASE.dwg SCALE: 1"= 150' ft LOCATION: Wigeon Reservoir	DRAWN: RA	CHECKED:	APPROVED: BD	PROJECT MANAGER: BD
SHEET NUMBER				
3 of				
REV: -				
DATE:				

Appendix B

**COMPLETED 2001 WETLAND MITIGATION SITE MONITORING
FORM**

COMPLETED 2001 BIRD SURVEY FORMS

COMPLETED 2001 WETLAND DELINEATION FORMS

**COMPLETED 2001 FIELD AND FUNCTIONAL ASSESSMENT
FORMS**

**COMPLETED 2001 MACROINVERTEBRATE SAMPLING
RESULTS**

*MDT Wetland Mitigation Monitoring
Wigeon Reservoir
Alzada, Montana*

DRAFT - MDT WETLAND MITIGATION SITE MONITORING FORM

Project Name: Wigeon Wetland Project Number: 215-28 Assessment Date: 22/Aug/2001
 Location: Alzoda MDT District: Five Milepost:
 Legal description: T R Section Time of Day: 11:30 AM
 Weather Conditions: Partly cloudy, 85° Person(s) conducting the assessment:
 Initial Evaluation Date: 31/Jan/96 Visit #: 2 Monitoring Year: 1
 Size of evaluation area: 15 acres Land use surrounding wetland: Rangeland

HYDROLOGY

Surface Water

Inundation: Present ☒ Absent ☐ Average depths: 3 ft Range of depths: 1 - 6 ft

Assessment area under inundation: 70%

Depth at emergent vegetation-open water boundary: 1 ft

If assessment area is not inundated are the soils saturated w/in 12" of surface: Yes ☐ No ☐

Other evidence of hydrology on site (drift lines, erosion, stained vegetation etc.):

Groundwater

Monitoring wells: Present ☐ Absent ☒

Record depth of water below ground surface

Well #	Depth	Well #	Depth	Well #	Depth

Additional Activities Checklist:

- * Map emergent vegetation-open water boundary on air photo
☒ Observe extent of surface water during each site visit and look for evidence of past surface water elevations (drift lines, erosion, vegetation staining etc.)
NA GPS survey groundwater monitoring wells locations if present

COMMENTS/PROBLEMS:

* Emergent vegetation/open water boundary is functionally the same as the shoreline in most areas

VEGETATION COMMUNITIES



Community No.: 1 Community Title (main species): BOGR

Dominant Species	% Cover	Dominant Species	% Cover
<i>Bouteloua gracilis</i>	10%	<i>Grindelia gracilifolia</i>	10%
<i>Festuca idahoensis</i>	10%		
<i>Artemisia tridentata</i>	10%		
<i>Spiked wheatgrass</i>	10%		
<i>Agropyron cristatum</i>	10%		

COMMENTS/PROBLEMS: This community is characteristic of the upland rangeland surrounding the reservoir.

Community No.: 2 Community Title (main species): PHPR

Dominant Species	% Cover	Dominant Species	% Cover
<i>Phleum pratense</i>	50%		
<i>Hordeum jubatum</i>	30%		
<i>Grindelia gracilifolia</i>	10%		
	90%		

COMMENTS/PROBLEMS: fringe of wetland

Community No.: 3 Community Title (main species): Typha

Dominant Species	% Cover	Dominant Species	% Cover
<i>Typha spp.</i>	30%		
<i>Carex rostrata</i>	15%		
<i>Juncus spp.</i>	15%		

COMMENTS/PROBLEMS: _____

Additional Activities Checklist:

☒ Record and map vegetative communities on air photo

MDT WETLAND MONITORING - VEGETATION TRANSECT


 Site: Wigeon Date: 22 Aug 01 Examiner: LeCain, WWI Transect # 2

 Approx. transect length: 60 ft Compass Direction from Start (Upland): 10°

Vegetation type 1: <u>BOGR</u>	
Length of transect in this type: <u>20</u>	feet
Species:	Cover:
<i>Bouteloua gracilis</i>	10%
<i>Festuca idahoensis</i>	10%
<i>Artemisia tridentata</i>	10%
<i>Spiked Wheatgrass</i>	10%
<i>Agropyron cristatum</i>	10%
<i>Grindelia gracilifolia</i>	10%
Total Vegetative Cover: <u>60%</u>	

Vegetation type 3: <u>PHPR</u>	
Length of transect in this type: <u>25</u>	feet
Species:	Cover:
<i>Phleum pratense</i>	50%
<i>Hordeum jubatum</i>	30%
<i>Grindelia gracilifolia</i>	10%
Total Vegetative Cover: <u>90%</u>	

Vegetation type 2: <u>CARA</u>	
Length of transect in this type: <u>15</u>	feet
Species:	Cover:
<i>Carex rostrata</i>	30%
<i>Typha spp.</i>	20%
<i>Juncus spp.</i>	20%
Total Vegetative Cover: <u>70</u>	

Vegetation type 4:	
Length of transect in this type:	feet
Species:	Cover:
Total Vegetative Cover:	

LAND & WATER B-4

Source:

P = Planted
V = Volunteer

Notes:

[illegible]

[illegible]

COMMENTS/PROBLEMS:

PHOTOGRAPHS

Using a camera with a 50 mm lenses and color film take photographs of the following permanent reference points listed in the checklist below. Record the direction of the photograph using a compass. (The first time at each site establish a permanent reference point by setting a ½ inch rebar or fencepost extending 2-3' above ground, survey the location with a resource grade GPS and mark the location on the air photo.)

Checklist:

- ☒ One photo for each of the 4 cardinal directions surrounding wetland
- ☒ At least one photo showing upland use surrounding wetland – if more than one upland use exists, take additional photos
- ☒ At least one photo showing buffer surrounding wetland
- ☐ One photo from each end of vegetation transect showing transect

Location	Photo Frame #	Photograph Description	Compass Reading
A	8 4a	Wetland view	W
B	4 3a	Upland use	E N
C	5 2a	Wetland buffer	A W
D	2 1a	Wetland view	N
E	7 2a	Wetland view	A N
F	24	Wetland view	S
G	23 21A	Vegetation transect Begin	
H	22 20A	Vegetation transect End	

COMMENTS/PROBLEMS:

~~Frames 1 & 2 at sample points SP-1 & SP-2~~

GPS SURVEYING

Using a resource grade GPS survey the items on the checklist below. Collect at least 3 location points with the GPS unit set at 5 second recording rate. Record file numbers for site in designated GPS field notebook

Checklist:

- ☒ Jurisdictional wetland boundary
- ☒ 4-6 landmarks recognizable on the air photo
- ☐ Start and end points of vegetation transect(s)
- ☐ Photo reference points
- ☐ Groundwater monitoring well locations

COMMENTS/PROBLEMS:

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: <u>Wigeon reservoir</u>	Date: <u>22 Aug 01</u>
Applicant/Owner: <u>MDT / BLM</u>	County: <u>Carter</u>
Investigator: <u>Le Cain, Wetlands West, Inc.</u>	State: <u>MT</u>
Do Normal Circumstances exist on the site? <input checked="" type="radio"/> Yes <input type="radio"/> No	Community ID: <u>ROGR</u>
Is the site significantly disturbed (Atypical Situation)? <input type="radio"/> Yes <input checked="" type="radio"/> No	Transect ID: <u>UP-1</u>
Is the area a potential Problem Area? <input type="radio"/> Yes <input checked="" type="radio"/> No (If needed, explain on reverse.)	Plot ID: <u>SP-1</u>

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>BOGR</u>	<u>H</u>	<u>—</u>	9. _____	_____	_____
2. <u>ARTR</u>	<u>S</u>	<u>—</u>	10. _____	_____	_____
3. <u>FEID</u>	<u>H</u>	<u>—</u>	11. _____	_____	_____
4. _____	_____	_____	12. _____	_____	_____
5. _____	_____	_____	13. _____	_____	_____
6. _____	_____	_____	14. _____	_____	_____
7. _____	_____	_____	15. _____	_____	_____
8. _____	_____	_____	16. _____	_____	_____

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-): 0

Remarks: Arid rangeland

HYDROLOGY

<p><input type="checkbox"/> Recorded Data (Describe in Remarks):</p> <p><input type="checkbox"/> Stream, Lake, or Tide Gauge</p> <p><input type="checkbox"/> Aerial Photographs</p> <p><input type="checkbox"/> Other</p> <p><input checked="" type="checkbox"/> No Recorded Data Available</p>	<p>Wetland Hydrology Indicators:</p> <p>Primary Indicators:</p> <p><input type="checkbox"/> Inundated</p> <p><input type="checkbox"/> Saturated in Upper 12 Inches</p> <p><input type="checkbox"/> Water Marks</p> <p><input type="checkbox"/> Drift Lines</p> <p><input type="checkbox"/> Sediment Deposits</p> <p><input type="checkbox"/> Drainage Patterns in Wetlands</p> <p>Secondary Indicators (2 or more required):</p> <p><input type="checkbox"/> Oxidized Root Channels in Upper 12 Inches</p> <p><input type="checkbox"/> Water-Stained Leaves</p> <p><input type="checkbox"/> Local Soil Survey Data</p> <p><input type="checkbox"/> FAC-Neutral Test</p> <p><input type="checkbox"/> Other (Explain in Remarks)</p>
<p>Field Observations:</p> <p>Depth of Surface Water: <u>NA</u> (in.)</p> <p>Depth to Free Water in Pit: <u>NA</u> (in.)</p> <p>Depth to Saturated Soil: <u>NA</u> (in.)</p>	
<p>Remarks: <u>No evidence of wetland hydrology</u></p>	

SOILS

16SC, Gardrum-Alster complex

Map Unit Name (Series and Phase): <u>277D</u> <u>Moyer son-Orinoco Silty clay loam</u>		Drainage Class: <u>WA</u>
Taxonomy (Subgroup): _____		Field Observations Confirm Mapped Type? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

Profile Description:					
Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-4	A	Reddish gray 5YR 5/2	—	—	clay loam
4-18	B	5YR 5/2	—	—	clay loam

Hydric Soil Indicators:	
<input type="checkbox"/> Histosol <input type="checkbox"/> Histic Epipedon <input type="checkbox"/> Sulfidic Odor <input type="checkbox"/> Aquic Moisture Regime <input type="checkbox"/> Reducing Conditions <input type="checkbox"/> Gleyed or Low-Chrome Colors	<input type="checkbox"/> Concretions <input type="checkbox"/> High Organic Content in Surface Layer in Sandy Soils <input type="checkbox"/> Organic Streaking in Sandy Soils <input type="checkbox"/> Listed on Local Hydric Soils List <input type="checkbox"/> Listed on National Hydric Soils List <input type="checkbox"/> Other (Explain in Remarks)

Remarks: <u>Not a hydric soil</u>

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes <input checked="" type="radio"/> No (Circle) Wetland Hydrology Present? Yes <input checked="" type="radio"/> No (Circle) Hydric Soils Present? Yes <input checked="" type="radio"/> No (Circle)	Is this Sampling Point Within a Wetland? Yes <input checked="" type="radio"/> No (Circle)
---	---

Remarks: <u>Upland site</u>

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: <u>Wigeon</u>	Date: <u>22 Aug 2001</u>
Applicant/Owner: <u>MDT / BLM</u>	County: <u>Carter</u>
Investigator: <u>LeCain, Wetlands West Inc.</u>	State: <u>MT</u>
Do Normal Circumstances exist on the site? <input checked="" type="radio"/> Yes <input type="radio"/> No	Community ID: <u>Typha</u>
Is the site significantly disturbed (Atypical Situation)? <input type="radio"/> Yes <input checked="" type="radio"/> No	Transect ID: <u>W-1</u>
Is the area a potential Problem Area? <input type="radio"/> Yes <input checked="" type="radio"/> No	Plot ID: <u>SP-2</u>
(If needed, explain on reverse.)	

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <u>Typha spp.</u>	<u>H</u>	<u>Obl</u>	9. _____	_____	_____
2. <u>Carex spp.</u>	<u>H</u>	<u>Obl</u>	10. _____	_____	_____
3. <u>Juncus spp.</u>	<u>H</u>	<u>Obl</u>	11. _____	_____	_____
4. _____	_____	_____	12. _____	_____	_____
5. _____	_____	_____	13. _____	_____	_____
6. _____	_____	_____	14. _____	_____	_____
7. _____	_____	_____	15. _____	_____	_____
8. _____	_____	_____	16. _____	_____	_____
Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-): <u>100%</u>					
Remarks:					

HYDROLOGY

<p>Recorded Data (Describe in Remarks):</p> <p><input type="checkbox"/> Stream, Lake, or Tide Gauge</p> <p><input type="checkbox"/> Aerial Photographs</p> <p><input type="checkbox"/> Other</p> <p><input checked="" type="checkbox"/> No Recorded Data Available</p>	<p>Wetland Hydrology Indicators:</p> <p>Primary Indicators:</p> <p><input type="checkbox"/> Inundated</p> <p><input checked="" type="checkbox"/> Saturated in Upper 12 Inches</p> <p><input checked="" type="checkbox"/> Water Marks</p> <p><input type="checkbox"/> Drift Lines</p> <p><input type="checkbox"/> Sediment Deposits</p> <p><input checked="" type="checkbox"/> Drainage Patterns in Wetlands</p> <p>Secondary Indicators (2 or more required):</p> <p><input type="checkbox"/> Oxidized Root Channels in Upper 12 Inches</p> <p><input type="checkbox"/> Water-Stained Leaves</p> <p><input type="checkbox"/> Local Soil Survey Data</p> <p><input type="checkbox"/> FAC-Neutral Test</p> <p><input type="checkbox"/> Other (Explain in Remarks)</p>
<p>Field Observations:</p> <p>Depth of Surface Water: <u>NA</u> (in.)</p> <p>Depth to Free Water in Pit: <u>NA</u> (in.)</p> <p>Depth to Saturated Soil: <u>0</u> (in.)</p>	
Remarks:	

2770

Map Unit Name (Series and Phase): Moyerison - Orange silty clay loam Drainage Class: NA

Taxonomy (Subgroup): _____ Field Observations Confirm Mapped Type? (Yes) No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-3	A	gray 7.5 YR 5/1	Red 10 R 4/18	40% / prominent	clay loam
3-18	B	very dark gray 7.5 YR 3/1	Red 10 R 4/18	40% / prominent	clay loam

Hydric Soil Indicators:

<input type="checkbox"/> Histosol	<input checked="" type="checkbox"/> Concretions
<input type="checkbox"/> Histic Epipedon	<input type="checkbox"/> High Organic Content in Surface Layer in Sandy Soils
<input type="checkbox"/> Sulfidic Odor	<input type="checkbox"/> Organic Streaking in Sandy Soils
<input type="checkbox"/> Aquic Moisture Regime	<input type="checkbox"/> Listed on Local Hydric Soils List
<input type="checkbox"/> Reducing Conditions	<input type="checkbox"/> Listed on National Hydric Soils List
<input checked="" type="checkbox"/> Gleyed or Low-Chroma Colors	<input type="checkbox"/> Other (Explain in Remarks)

Remarks: Mottles throughout profile

WETLAND DETERMINATION

Hydrophytic Vegetation Present? <input checked="" type="radio"/> Yes No (Circle) Wetland Hydrology Present? <input checked="" type="radio"/> Yes No Hydric Soils Present? <input checked="" type="radio"/> Yes No	Is this Sampling Point Within a Wetland? <input checked="" type="radio"/> Yes No
Remarks: <i>Depressional wetland along fringes of the reservoir</i>	

Draft Field Data Collection Sheet for MDT Montana Wetland Assessment Form

1. CLASSIFICATION

Vegetated Cowardin Class	Estimated % of AA	Predominant Water Regime (CIRCLE)
Emergent	20%	(PF) IE SPF SF S TF IF
Aquatic Bed	30%	(PF) IE SPF SF S TF IF
Moss-Lichen	—	PF IE SPF SF S TF IF
Scrub-Shrub	—	PF IE SPF SF S TF IF
Forested	—	PF IE SPF SF S TF IF
Total Estimated % Vegetated	50%	

2. DISTURBANCE is: High ☒ Moderate ☒ Low Cattle disturb.

3. HYDROLOGY

Do wetlands on site pond or flood? ☒ Y ☐ N (if no, skip to groundwater discharge/recharge portion of this section)

Does AA contain surface or subsurface outlet? Y ☒ N ☐ If outlet present, is it restricted (subsurface will always be "yes")? Y ☐ N

Longest duration of surface water:	Surface Water Duration and other attributes (circle)		
at any wetlands within AA	(Perm / Peren)	Seas / Intermit	Temp / Ephem
in at least 10% of AA (both wetlands and nonwetlands [deepwater, streambed...])	(Perm / Peren)	Seas / Intermit	Temp / Ephem
where fish are or historically were present (cross out if not applicable)	(Perm / Peren)	Seas / Intermit	Temp / Ephem
% of waterbody containing cover objects	>25%	(10-25%)	<10%
% bank or shore with riparian or wetland shrub or forested communities	>75%	50-74%	(<50%)
adjacent to rooted wetland vegetation along a defined watercourse or shoreline subject to wave action (cross out if not applicable)	Perm / Peren	(Seas / Intermit)	Temp / Ephem
% cover of wetland bank or shore by sp. with binding rootmasses	>65%	(35-64%)	<35%

Do any wetlands on site flood as a result of in-channel or overbank flow? ☒ Y ☐ N (if no, go to groundwater section below)

Estimated wetland area subject to periodic flooding (acres): ≥ 10 ☒ Y ☐ N

Estimated % of flooded wetland classified SS, FO or both: ≥ 75 ☒ Y ☐ N

Evidence of groundwater discharge or recharge? ☒ Y ☐ N List: No surface outlet

4. VERTEBRATES

Evidence of or potential for T&E or MNHP species use? (For general wildlife use, see separate form.)

MNHP - Leopard Frogs
(See Data sheet)

Fish observations?

5. OTHERS

Do wetlands have potential to receive excess sediments, nutrients, or toxicants? ☒ Y ☐ N

Potential to receive: low to moderate levels ☒ Y ☐ N high levels

From: Grazing

Does site contain bog, fen, warm springs, >80 year-old forested wetland, or MNHP "S1" or "S2" plant association? Y ☒ N ☐

List:

Is AA a known recreation / education site? Y ☒ N ☐

Does AA offer strong potential for use as recreation / education site? Y ☒ N ☐

Type: N

MDT Montana Wetland Assessment Form (revised 5/25/1999)

1. Project Name: Wiggon Reservoir 2. Project #: Site 26 Control

3. Task 28

3. Evaluation Date: Mo. 1 Day 9 Yr. 02 4. Evaluator(s): Dave
Eleen 5. Wetlands/Site3. Wetland Location(s): i. Legal: T 5 N or S R 59 E or W; S 23 : 26 ; T N or S; R E or W; S

ii. Approx. Stationing or Mileposts:

iii. Watershed: 10110202 GPS Reference No. (if applies):

Other Location Information:

a. Evaluating Agency: Wetlands West

b. Purpose of Evaluation:

1. Wetlands potentially affected by MDT project2. Mitigation wetlands; pre-construction3. X Mitigation wetlands; post-construction4. Other8. Wetland size: (total acres) 8.2 (visually estimated)
(measured, e.g. by GPS (if applies))9. Assessment area: (AA, tot., ac.,
see instructions on determining AA) 8.2 (visually estimated)
(measured, e.g. by GPS (if applies))

10. Classification of Wetland and Aquatic Habitats in AA (HGM according to Brinson, first col.; USFWS according to Cowardin [1979], remaining cols.)

H.	Class	System	Subsystem	Class	Water Regime	Modifier	% of AA
	Lacustrine	Lacustrine	Limnetic	UB	PF (H)	I	67%
	Lacustrine	Lacustrine	Littoral	AB	SF, sat	I	23%

Abbreviations: System: Palustrine (PY) Subsystem: none/ Classes: Rock Bottom (RB), Unconsolidated bottom (UB), Aquatic Bed (AB), Unconsolidated Shore (US), Moss-lichen Wetland (ML), Emergent Wetland (EM), Scrub-Shrub Wetland (SS), Forested Wetland (FO) System: Lacustrine (L), Subsystem: Limnetic (2) Classes: RB, UB, AB/ Subsystem: Littoral (4) Classes: RB, UB, AB, US, EM/ System: Riverine (R) Subsystem: Lower Perennial (2) Classes: RB, UB, AB, US, EM/ Subsystem: Upper Perennial (3) Classes: RB, UB, AB, US/ Water Regimes: Permanently Flooded (H), Intermittently Exposed (G), Semipermanently Flooded (F), Seasonally Flooded (C), Saturated (B), Temporarily Flooded (A), Intermittently Flooded (J) Modifiers: Excavated (E), Impounded (I), Diked (D), Partly Drained (PD), Farmed (F), Artificial (A) HGM Classes: Riverine, Depressional, Slope, Mineral Soil Flats, Organic Soil Flats, Lacustrine Fringe

11. Estimated relative abundance: (of similarly classified sites within the same Major Montana Watershed Basin, see definitions)

(Circle one)

Unknown

Rare

Common

Abundant

Comments:

12. General condition of AA:

i. Regarding disturbance: (use matrix below to determine [circle] appropriate response)

Conditions within AA	Predominant conditions adjacent to (within 500 feet of) AA		
Land managed in predominantly natural state; is not grazed, hayed, logged, or otherwise converted; does not contain roads or buildings.	Land not cultivated, but moderately grazed or hayed or selectively logged; or has been subject to minor clearing; contains few roads or buildings.	Land cultivated or heavily grazed or logged; subject to substantial fill placement, grading, clearing, or hydrological alteration; high road or building density.	
A not cultivated, but moderately grazed or hayed or selectively logged; or has been subject to relatively minor clearing, fill placement, or hydrological alteration; contains few roads or buildings.	low disturbance	low disturbance	moderate disturbance
A cultivated or heavily grazed or logged; subject to relatively substantial fill placement, grading, clearing, or hydrological alteration; high road or building density.	moderate disturbance	moderate disturbance	high disturbance
	high disturbance	high disturbance	high disturbance

Comments: (types of disturbance, intensity, season, etc.):

Prominent weedy, alien, & introduced species (including those not domesticated, feral): (list)

iii. Provide brief descriptive summary of AA and surrounding land use/habitat:

13. Structural Diversity: (based on number of "Cowardin" vegetated classes present [do not include unvegetated classes], see #10 above)

# of "Cowardin" vegetated classes present in AA (see #10)	≥ 3 vegetated classes (or ≥ 2 if one is forested)	2 vegetated classes (or 1 if forested)	≤ 1 vegetated class
Rating (circle)	High	Moderate	Low

Comments:

SECTION PERTAINING to FUNCTIONS & VALUES ASSESSMENT

didn't count sage!

14A. Habitat for Federally Listed or Proposed Threatened or Endangered Plants or Animals:

i. AA is Documented (D) or Suspected (S) to contain (circle one based on definitions contained in instructions):

Primary or critical habitat (list species)	D S	
Secondary habitat (list species)	D S	
Incidental habitat (list species)	D S	
No usable habitat	D S	

ii. Rating (use the conclusions from i above and the matrix below to arrive at [circle] the functional points and rating [H = high, M = moderate, or L = low] for this function)

Highest Habitat Level	doc./primary	sus./primary	doc./secondary	sus./secondary	doc./incidental	sus./incidental	None
Functional Points and Rating	1 (H)	.9 (H)	.8 (M)	.7 (M)	.5 (L)	.3 (L)	0 (L)

So, for documented use (e.g. observations, records, etc.):

14B. Habitat for plant or animals rated S1, S2, or S3 by the Montana Natural Heritage Program: (not including species listed in 14A above)

i. AA is Documented (D) or Suspected (S) to contain (circle one based on definitions contained in instructions):

Primary or critical habitat (list species)	D S	breeding - Kana pipiens
Secondary habitat (list species)	D S	
Incidental habitat (list species)	D S	
No usable habitat	D S	

ii. Rating (use the conclusions from i above and the matrix below to arrive at [circle] the functional points and rating [H = high, M = moderate, or L = low] for this function)

Highest Habitat Level	doc./primary	sus./primary	doc./secondary	sus./secondary	doc./incidental	sus./incidental	None
Functional Points and Rating	1 (H)	.8 (H)	.7 (M)	.6 (M)	.2 (L)	.1 (L)	0 (L)

Sources for documented use (e.g. observations, records, etc.):

Obs. by RL in field 8/02

14C. General Wildlife Habitat Rating:

i. Evidence of overall wildlife use in the AA (circle substantial, moderate, or low based on supporting evidence):

Substantial (based on any of the following [check]):

- observations of abundant wildlife #s or high species diversity (during any period)
- abundant wildlife sign such as scat, tracks, nest structures, game trails, etc.
- presence of extremely limiting habitat features not available in the surrounding area
- interviews with local biologists with knowledge of the AA

Low (based on any of the following [check]):

- few or no wildlife observations during peak use periods
- little to no wildlife sign
- sparse adjacent upland food sources
- interviews with local biologists with knowledge of the AA

Moderate (based on any of the following [check]):

- observations of scattered wildlife groups or individuals or relatively few species during peak periods
- common occurrence of wildlife sign such as scat, tracks, nest structures, game trails, etc.
- adequate adjacent upland food sources
- interviews with local biologists with knowledge of the AA

cattle signs

racoon, deer

ii. Wildlife habitat features (working from top to bottom, circle appropriate AA attributes in matrix to arrive at exceptional (E), high (H), moderate (M), or low (L) rating. Structural diversity is from #13. For class cover to be considered evenly distributed, vegetated classes must be within 20% of each other in terms of their percent composition of the AA (see #10). Abbreviations for surface water durations are as follows: P/P = permanent/perennial;

S/I = seasonal/intermittent; T/E = temporary/ephemeral; and A = absent [see instructions for further definitions of these terms].)

Structural diversity (see #13)	High								Moderate								Low			
	Even				Uneven				Even				Uneven				Even			
Cover distribution (in vegetated classes)	P/P	S/I	T/E	A	P/P	S/I	T/E	A	P/P	S/I	T/E	A	P/P	S/I	T/E	A	P/P	S/I	T/E	A
Duration of surface water in $\geq 10\%$ of AA																				
Low disturbance at AA (see #12i)	E	E	E	E	E	E	H	H	E	H	H	M	E	H	M	M	E	H	M	H
Moderate disturbance at AA (see #12i)	H	H	H	H	H	H	H	H	H	H	M	M	H	M	M	L	H	M	L	L
High disturbance at AA (see #12i)	M	M	M	L	M	M	L	L	M	M	L	L	M	L	L	L	L	L	L	L

iii. Rating (use the conclusions from i and ii above and the matrix below to arrive at [circle] the functional points and rating [E = exceptional, H = high, M = moderate, or L = low] for this function)

Evidence of wildlife use (i)	Wildlife habitat features rating (ii)			
	Exceptional	High	Moderate	Low
Substantial	1 (E)	.9 (H)	.8 (H)	.7 (M)
Moderate	.9 (H)	.7 (M)	.5 (M)	.3 (L)
Minimal	.6 (M)	.4 (M)	.2 (L)	.1 (L)

Comments:

14D. General Fish/Aquatic Habitat Rating: (Assess this function if the AA is used by fish or the existing situation is "correctable" such that the AA could be used by fish [i.e., fish use is precluded by perched culvert or other barrier, etc.]. If the AA is not or was not historically used by fish due to lack of habitat, excessive gradient, etc., circle NA here and proceed to the next function. If fish use occurs in the AA but is not desired from a resource management perspective [such as fish use within an irrigation canal], then Habitat Quality [i below] should be marked as "Low", applied accordingly in ii below, and noted in the comments.)

i. Habitat Quality (circle appropriate AA attributes in matrix to arrive at exceptional (E), high (H), moderate (M), or low (L) quality rating.)

Duration of surface water in AA	Permanent / Perennial			Seasonal / Intermittent			Temporary / Ephemeral		
	$\geq 25\%$	10-25%	$<10\%$	$\geq 25\%$	10-25%	$<10\%$	$\geq 25\%$	10-25%	$<10\%$
Cover - % of waterbody in AA containing cover objects such as emergent logs, large rocks & boulders, overhanging banks, floating-leaved vegetation, etc.									
Shading - $>75\%$ of streambank or shoreline within AA contains riparian or wetland scrub-shrub or forested communities	E	E	H	H	H	M	M	M	M
Shading - 50 to 75% of streambank or shoreline within AA contains rip. or wetland scrub-shrub or forested communities	H	H	M	M	M	M	M	L	L
Shading - $<50\%$ of streambank or shoreline within AA contains rip. or wetland scrub-shrub or forested communities	H	M	M	M	L	L	L	L	L

ii. Modified Habitat Quality (Circle the appropriate response to the following question. If answer is Y, then reduce rating in i above by one level [E = H, H = M, M = L, L = L]). Is fish use of the AA precluded or significantly reduced by a culvert, dike, or other man-made structure or activity or is the waterbody included on the MDEQ list of waterbodies in need of TMDL development with listed "Probable Impaired Uses" including cold or warm water fishery or aquatic life support? Y N Modified habitat quality rating = (circle) E H M L

iii. Rating (use the conclusions from i and ii above and the matrix below to arrive at [circle] the functional points and rating [E = exceptional, H = high, M = moderate, or L = low] for this function)

Types of fish known or suspected within AA	Modified Habitat Quality (ii)			
	Exceptional	High	Moderate	Low
Native game fish	1 (E)	.9 (H)	.7 (M)	.5 (M)
Introduced game fish	.9 (H)	.8 (H)	.6 (M)	.4 (M)
Non-game fish	.7 (M)	.6 (M)	.5 (M)	.3 (L)
No fish	.5 (M)	.3 (L)	.2 (L)	.1 (L)

Comments:

unknown, but could be planted vegetation?

14E. Flood Attenuation: (applies only to wetlands subject to flooding via in-channel or overbank flow. If wetlands in AA are not flooded from in-channel or overbank flow, circle NA here and proceed to next function.)

i. Rating (working from top to bottom, use the matrix below to arrive at [circle] the functional points and rating [H = high, M = moderate, or L = low] for this function)

Es. flooded wetland area in AA subject to periodic flooding	≥ 10 acres			$<10, \geq 2$ acres			≤ 2 acres		
	75%	25-75%	$<25\%$	75%	25-75%	$<25\%$	75%	25-75%	$<25\%$
% of flooded wetland classified as forested, scrub/shrub, or both									
AA contains no outlet or restricted outlet	1(H)	.9(H)	.6(M)	.8(H)	.7(H)	.5(M)	.4(M)	.3(L)	.2(L)
AA contains unrestricted outlet	.9(H)	.8(H)	.5(M)	.7(H)	.6(M)	.4(M)	.3(L)	.2(L)	.1(L)

ii. Are residences, businesses, or other features which may be significantly damaged by floods located within 0.5 miles downstream of the AA (circle)?

Y N
Comments:

14. **Short and Long Term Surface Water Storage:** (Applies to wetlands that flood or pond from overbank or in-channel flow, precipitation, upland surface flow, or groundwater flow. If no wetlands in the AA are subject to flooding or ponding, circle NA here and proceed with the evaluation.)

i. Rating (working from top to bottom, use the matrix below to arrive at [circle] the functional points and rating [H = high, M = moderate, or L = low] for this function. Abbreviations for surface water durations are as follows: P/P = permanent/perennial; S/I = seasonal/intermittent; and T/E = temporary/ephemeral [see instructions for further definitions of these terms].)

Estimated maximum acre feet of water contained in wetlands within the AA that are subject to periodic flooding or ponding	>5 acre feet			<5, >1 acre feet			≤1 acre foot		
Duration of surface water at wetlands within the AA	P/P	S/I	T/E	P/P	S/I	T/E	P/P	S/I	T/E
Wetlands in AA flood or pond ≥ 5 out of 10 years	1(H)	.9(H)	.8(H)	.8(H)	.6(M)	.5(M)	.4(M)	.3(L)	.2(L)
Wetlands in AA flood or pond < 5 out of 10 years	.9(H)	.8(H)	.7(M)	.7(M)	.5(M)	.4(M)	.3(L)	.2(L)	.1(L)

Comments:

(assumed)

14G. **Sediment/Nutrient/Toxicant Retention and Removal:** (Applies to wetlands with potential to receive excess sediments, nutrients, or toxicants through influx of surface or ground water or direct input. If no wetlands in the AA are subject to such input, circle NA here and proceed with the evaluation.)

i. Rating (working from top to bottom, use the matrix below to arrive at [circle] the functional points and rating [H = high, M = moderate, or L = low] for this function.

Sediment, nutrient, and toxicant input levels within AA	AA receives or surrounding land use with potential to deliver low to moderate levels of sediments, nutrients, or compounds such that other functions are not substantially impaired. Minor sedimentation, sources of nutrients or toxicants, or signs of eutrophication present.				Waterbody on MDEQ list of waterbodies in need of TMDL development for "probable causes" related to sediment, nutrients, or toxicants or AA receives or surrounding land use with potential to deliver high levels of sediments, nutrients, or compounds such that other functions are substantially impaired. Major sedimentation, sources of nutrients or toxicants, or signs of eutrophication present.			
% cover of wetland vegetation in AA	≥ 70%		< 70%		≥ 70%		< 70%	
Evidence of flooding or ponding in AA	Yes	No	Yes	No	Yes	No	Yes	No
AA gains no or restricted outlet	1 (H)	.8 (H)	.7 (M)	.5 (M)	.5 (M)	.4 (M)	.3 (L)	.2 (L)
AA contains unrestricted outlet	.9 (H)	.7 (M)	.6 (M)	.4 (M)	.4 (M)	.3 (L)	.2 (L)	.1 (L)

Comments:

14H **Sediment/Shoreline Stabilization:** (applies only if AA occurs on or within the banks or a river, stream, or other natural or man-made drainage, or on the shoreline of a standing water body which is subject to wave action. If does not apply, circle NA here and proceed to next function)

i. Rating (working from top to bottom, use the matrix below to arrive at [circle] the functional points and rating [E = exceptional, H = high, M = moderate, or L = low] for this function.

% Cover of wetland streambank or shoreline by species with deep, binding rootmasses	Duration of surface water adjacent to rooted vegetation		
	permanent / perennial	seasonal / intermittent	Temporary / ephemeral
≥ 65%	1 (H)	.9 (H)	.7 (M)
35-64%	.7 (M)	.6 (M)	.5 (M)
< 35%	.3 (L)	.2 (L)	.1 (L)

Comments:

14I. **Production Export/Food Chain Support:**

i. Rating (working from top to bottom, use the matrix below to arrive at [circle] the functional points and rating [H = high, M = moderate, or L = low] for this function. Factor A = acreage of vegetated component in the AA; Factor B = structural diversity rating from #13; Factor C = whether or not the AA contains a surface or subsurface outlet; the final three rows pertain to duration of surface water in the AA, where P/P = permanent/perennial; S/I = seasonal/intermittent; T/E = temporary/ephemeral or absent [see instructions for further definitions of these terms].)

A	Vegetated component >5 acres						Vegetated component 1-5 acres						Vegetated component <1 acre					
B	High		Moderate		Low		High		Moderate		Low		High		Moderate		Low	
C	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
P/P	1H	.9H	.9H	.8H	.8H	.7M	.9H	.8H	.8H	.7M	.7M	.6M	.7M	.6M	.6M	.4M	.4M	.3L
S/I	.9H	.8H	.8H	.7M	.7M	.6M	.8H	.7M	.7M	.6M	.6M	.5M	.6M	.5M	.5M	.3L	.3L	.2L
T/E	.8H	.7M	.7M	.6M	.6M	.5M	.7M	.6M	.6M	.5M	.5M	.4M	.5M	.4M	.4M	.2L	.2L	.1L

Comments:

14. **Groundwater Discharge/Recharge:** (Check the indicators in i & ii below that apply to the AA)

i. Discharge Indicators

- ☒ Springs are known or observed
- ☒ Vegetation growing during dormant season/drought
- ☒ Wetland occurs at the toe of a natural slope
- ☒ Seeps are present at the wetland edge
- ☒ AA permanently flooded during drought periods
- ☒ Wetland contains an outlet, but no inlet

ii. Recharge Indicators

- ☐ Permeable substrate present without underlying impeding layer
- ☐ Wetland contains inlet but no outlet
- ☐ Other

Other

iii. Rating: Use the information from i and ii above and the table below to arrive at [circle] the functional points and rating [H = high, L = low] for this function.

Criteria	Functional Points and Rating
AA is known Discharge/Recharge area or one or more indicators of D/R present	1 (H)
No Discharge/Recharge indicators present	.1 (L)
Available Discharge/Recharge information inadequate to rate AA D/R potential	N/A (Unknown)

Comments:

14K. Uniqueness:

i. Rating (working from top to bottom, use the matrix below to arrive at [circle] the functional points and rating [H = high, M = moderate, or L = low] for this function.

Replacement potential	AA contains fen, bog, warm springs or mature (>80 yr-old) forested wetland or plant association listed as "S1" by the MNHP			AA does not contain previously cited rare types and structural diversity (#13) is high or contains plant association listed as "S2" by the MNHP			AA does not contain previously cited rare types or associations and structural diversity (#13) is low-moderate		
Estimated relative abundance (#11)	rare	common	abundant	rare	common	abundant	rare	common	abundant
Low disturbance at AA (#12i)	1 (H)	.9 (H)	.8 (H)	.8 (H)	.6 (M)	.5 (M)	.5 (M)	.4 (M)	.3 (L)
Moderate disturbance at AA (#12i)	.9 (H)	.8 (H)	.7 (M)	.7 (M)	.5 (M)	.4 (M)	.4 (M)	.3 (L)	.2 (L)
High disturbance at AA (#12i)	.8 (H)	.7 (M)	.6 (M)	.6 (M)	.4 (M)	.3 (L)	.3 (L)	.2 (L)	.1 (L)

Comments:

14L. Recreation/Education Potential: i. Is the AA a known rec./ed. site: (circle) Y N (If yes, rate as [circle] High [1] and go to ii; if no go to iii)

ii. Check categories that apply to the AA: Educational/scientific study; Consumptive rec.; Non-consumptive rec.; Other

iii. Based on the location, diversity, size, and other site attributes, is there strong potential for rec./ed. use? Y N (If yes, go to ii, then proceed to iv; if no, then rate as [circle] Low [0.1])

iv. Rating (use the matrix below to arrive at [circle] the functional points and rating [H = high, M = moderate, or L = low] for this function.

Ownership	Disturbance at AA (#12i)		
	low	moderate	high
Public ownership	1 (H)	.5 (M)	.2 (L)
Private ownership	.7 (M)	.3 (L)	.1 (L)

Comments:

BLM Owned

FUNCTION & VALUE SUMMARY & OVERALL RATING

Function & Value Variables	Rating	Actual Functional Points	Possible Functional Points	Functional Units; (Actual Points x Estimated AA Acreage) 8.2
A. Listed/Proposed T&E Species Habitat	L	0	1	0
B. MT Natural Heritage Program Species Habitat	H	1	1	8.2
C. General Wildlife Habitat	m	.5	1	4.1
D. General Fish/Aquatic Habitat	m	.6	1	4.92
E. Flood Attenuation	m	.5	1	4.1
F. Short and Long Term Surface Water Storage	H	1	1	8.2
G. Sediment/Nutrient/Toxicant Removal	m	.7	1	5.74
H. Sediment/Shoreline Stabilization	m	.7	1	5.74
I. Production Export/Food Chain Support	m	.6	1	4.92
J. Groundwater Discharge/Recharge	H	1	1	8.2
K. Uniqueness	L	.3	1	2.46
L. Recreation/Education Potential	L	.1	1	.82
Totals:		7	12	57.4

58%

OVERALL ANALYSIS AREA (AA) RATING: (Circle appropriate category based on the criteria outlined below) I **II** III IV

Category I Wetland: (Must satisfy one of the following criteria; if does not meet criteria, go to Category II)

- ☐ Score of 1 functional point for Listed/Proposed Threatened or Endangered Species; or
- ☐ Score of 1 functional point for Uniqueness; or
- ☐ Score of 1 functional point for Flood Attenuation and answer to Question 14E.ii is "yes"; or
- ☐ Total actual functional points > 80% (round to nearest whole #) of total possible functional points.

Category II Wetland: (Criteria for Category I not satisfied and meets any one of the following criteria; if not satisfied, go to Category IV)

- ☒ Score of 1 functional point for Species Rated S1, S2, or S3 by the MT Natural Heritage Program; or
- ☐ Score of .9 or 1 functional point for General Wildlife Habitat; or
- ☐ Score of .9 or 1 functional point for General Fish/Aquatic Habitat; or
- ☐ "High" to "Exceptional" ratings for both General Wildlife Habitat and General Fish/Aquatic Habitat; or
- ☐ Score of .9 functional point for Uniqueness; or
- ☐ Total Actual Functional Points > 65% (round to nearest whole #) of total possible functional points.

Category III Wetland: (Criteria for Categories I, II or IV not satisfied)

Category IV Wetland: (Criteria for Categories I or II are not satisfied and all of the following criteria are met; if does not satisfy criteria go to Category III)

- ☐ "Low" rating for Uniqueness; and
- ☐ "Low" rating for Production Export/Food Chain Support; and
- ☐ Total actual functional points < 30% (round to nearest whole #) of total possible functional points

Macro-invertebrate Sampling Results for Wigeon Reservoir

Montana Department of Transportation Wetland Mitigation Monitoring Project for Land and Water Consulting	Project Name Project/task number Date Field Personnel Note	Wigeon Reservoir 215-28 8/22/2001 Wetlands West
2001	Rhithron Sample Identification	16
Coelenterata	<i>Hydra</i>	
Oligochaeta	Enchytraeidae	
	Naididae	
	<i>Chaetogaster</i>	
	<i>Nais elinguis</i>	
	<i>Nais variabilis</i>	124
	<i>Ophidonais serpentina</i>	
	Tubificidae	
	Tubificidae - immature	
	<i>Limnodrilus hoffmeisteri</i>	
Hirudinea	Erpobdellidae	
	<i>Mooreobdella microstoma</i>	
	<i>Nepheleopsis</i>	
	Glossiphoniidae	
	<i>Helobdella stagnalis</i>	
	<i>Helobdella</i>	
	<i>Glossiphonia</i>	
Bivalvia	Sphaeriidae	
Gastropoda	Lymnaeidae	
	<i>Sphaerium</i>	
	<i>Fossaria</i>	
	Physidae	4
	<i>Physa</i>	
	Planorbidae	1
	<i>Gyraulus</i>	
	<i>Helisoma</i>	
Crustacea	Cladocera	1
	Calanoida	2
	Cyclopoida	5
	Ostracoda	6
	Amphipoda	
	<i>Gammarus</i>	
	<i>Hyalella azteca</i>	59
	Decapoda	
	<i>Orconectes</i>	
Acarina	Acari	
Odonata	Aeshnidae	
	<i>Anax</i>	
	Libellulidae	
	Libellulidae-early instar	1
	<i>Sympetrum</i>	
	Coenagrionidae	
	Coenagrionidae-early instar	14
	<i>Enallagma</i>	
	Lestidae	
	<i>Lestes</i>	
Ephemeroptera	Baetidae	1
	<i>Callibaetis</i>	
	Caenidae	7
	<i>Caenis</i>	
Hemiptera	Corixidae	1
	Corixidae - immature	
	<i>Hesperocorixa</i>	
	<i>Sigara</i>	
	<i>Trichocorixa</i>	
	Nepidae	
	<i>Ranatra</i>	
	Notonectidae	3
	<i>Notonecta</i>	
Trichoptera	Hydroptilidae	
	Hydroptilidae - pupa	
	Leptoceridae	
	Leptoceridae - early instar	
	<i>Mystacides</i>	
	<i>Ylodes</i>	
Coleoptera	Chrysomelidae	
	Chrysomelidae	
	Curculionidae	
	<i>Bagous</i>	
	Dytiscidae	
	<i>Aclius</i>	
	Hydroporinae - early instar larvae	
	<i>Hygrotus</i>	
	<i>Liodes</i>	
	<i>Laccophilus</i>	
	<i>Neoporus</i>	
	Elmidae	
	<i>Heterlimnius</i>	
	Halipidae	
	<i>Halipus</i>	
	<i>Peltodytes</i>	
	Hydrophilidae	
	<i>Berosus</i>	
	<i>Helophorus</i>	
	<i>Hydrobius</i>	
	<i>Hydrochara</i>	
	<i>Laccobius</i>	
	<i>Tropisternus</i>	

Macro-invertebrate Sampling Results for Wigeon Reservoir



Diptera

Ceratopogoninae

Bezzia/Palpomysia

Dasyhelea

Chaoboridae *Chaoborus*

Culicidae *Anopheles*

Culex

Ephydriidae *Ephydriidae*

Simuliidae *Simulium*

Sciomyzidae *Sciomyzidae*

Stratiomyidae *Odontomyia*

Chironomidae *Acricotopus*

Chironomus

Cladotanytarsus

Corynoneura 1

Cryptotendipes

Dicortendipes 7

Einfeldia

Endochironomus

Labrundinia

Microtendipes 2

Orthocladus annectens

Parachironomus

Paramerina 3

Paratanytarsus

Phaenopsectra

Polypedilum

Procladius

Psectrocladius 1

Psectrotanytus 3

Pseudochironomus

Tanytus

Tanytarsus 16

TOTAL 262

grids 4

Total taxa 21

POET 2

Chironomidae taxa 7

Crustacea taxa + Mollusca taxa 3

% Chironomidae 12.59541985

Orthocladinae/Chironomidae 6.060606061

%Amphipoda 22.51908397

%Crustacea + %Mollusca 24.42748092

HBI 7.759541985

%Dominant taxon 47.32824427

%Collector-Gatherers 89.69465649

%Filterers 0.381679389

Total taxa 5

POET 3

Chironomidae taxa 5

Crustacea taxa + Mollusca taxa 5

% Chironomidae 1

Orthocladinae/Chironomidae 1

%Amphipoda 1

%Crustacea + %Mollusca 1

HBI 1

%Dominant taxon 3

%Collector-Gatherers 5

%Filterers 3

site score 34

Appendix C

WATER RUNOFF CALCULATIONS REPRESENTATIVE PHOTOGRAPHS

*MDT Wetland Mitigation Monitoring
Wigeon Reservoir
Alzada, Montana*

Worksheet 1: Runoff curve number (CN)

Client BLM By RB Date 1-8-97County Carter State MT Checked _____ Date _____Practice Wigean ResT5S R59E SEC.23 SE⁴SW⁴

Soil name and hydrologic group (table 2-1)	Cover description (cover type, treatment, and hydrologic condition)	CN (table 2-3)	Area (acres or %)	Product of CN × area
Kober "C"	Ronge	80	100 %	8000
Totals =			100	8000

CN (weighted) =

$$\frac{8000}{100} = 80$$

Use CN =

80

Worksheet 2: Time of concentration and peak discharge



Client BLM. By CEB Date 1-9-97
 County Carter State MT Checked _____ Date _____
 Practice Wigean Res.

Estimating time of concentration

1. Data:

Rainfall distribution type = II (I, IA, II, III)
 Drainage area A = 254 ac
 Runoff curve number CN = 80 (Worksheet 1)
 Watershed slope Y = 6 %
 Flow length l = 10,000 ft

2. T_c using l , Y, CN and figure 2-27 = 1.3 hrs
 or using equation 2-5

$$T_c = \frac{l^{0.8} \left[\frac{1000}{CN} - 9 \right]^{0.7}}{1140 Y^{0.5}} = \frac{()^{0.8} ()^{0.7}}{1140 ()^{0.5}} = \text{_____} \text{ hrs}$$

Estimating peak discharge

1. Frequency yr
 2. Rainfall, P (24-hour) in
 3. Initial abstraction, I_a in
 (Use CN with table 2-4)
 4. Compute I_a/P ratios
 5. Unit peak discharge q_u cfs/ac/in
 (Use T_c and I_a/P with exhibit 2-11)
 6. Runoff, Q in
 (Use P and CN with figure 2-26 or table 2-2)
 7. Peak discharge, q_p cfs
 (Where $q_p = q_u AQ$)

Storm #1	Storm #2	Storm #3
25		
3.30		
.500		
0.152		
.20		-
1.42		
72		

$$q_p = (.20)(254)(1.42) = 72$$

$$\begin{aligned} \text{Runoff in AC.Ft.} \\ (254 \text{ ac})(1.42 \text{ runoff}) &= 360 \text{ AC. in.} \\ \frac{360}{12} &= 30 \text{ AC. Ft.} \end{aligned}$$

Spwy Design:

Peak Flow 72 cfs. Level crest 20' Flow depth 1.0' 2.3 cfs/ft. width

$$\frac{72}{2.3} = 31' \text{ wide spwy needed } 100' \text{ available}$$



Photo point A, view West



Photo point E, view NE



Photo point D, view North



Photo point C, wetland buffer; view West



Photo point G, begin transect



Photo point H, end transect



Photo point B, upland use; view North

Appendix D

BIRD SURVEY PROTOCOL MACROINVERTEBRATE SAMPLING PROTOCOL GPS PROTOCOL

*MDT Wetland Mitigation Monitoring
Wigeon Reservoir
Alzada, Montana*

BIRD SURVEY PROTOCOL

The following is an outline of the MDT Wetland Mitigation Site Monitoring Bird Survey Protocol. Though each site is vastly different, the bird survey data collection methods must be standardized to a certain degree to increase repeatability. An Area Search within a restricted time frame will be used to collect the following data: a bird species list, density, behavior, and habitat-type use. There will be some decisions that team members must make to fit the protocol to their particular site. Each of the following sections and the desired result describes the protocol established to reflect bird species use over time.

Species Use within the Mitigation Wetland: Survey Method

Result: To conduct a bird survey of the wetland mitigation site within a restricted period of time and the budget allotment.

Sites that can be circumambulated or walked throughout.

These types of sites will include ponds, enhanced historic river channels, wet meadows, and any area that can be surveyed from the entirety of its perimeter or walked throughout. If the wetland is not uncomfortably inundated, conduct several “meandering” transects through the site in an orderly fashion (record the number and approximate location/direction of the transects in the field notebook; they do not have to be formalized or staked). If a very small portion of the site cannot be crossed due to inundation, this method will also apply. Though the sizes of the site vary, each site will require surveying to the fullest extent possible within a set time limit. The optimum times to conduct the survey are in the morning hours. Conduct the survey from sunrise to no later than 11:00 AM. (Note: some sites may have to be surveyed in the late afternoon or evening due to time constraints or weather; if this is the case, record the time of day and include this information in your report discussion.) If the survey is completed before 11:00 AM and no additions are being made to the list, then the task is complete. The overall limiting factor regarding the number of hours that are spent conducting this survey is the number of budgeted hours; this determination must be made by site by each individual.

In many cases, binoculars will be the only instrument that is needed to identify and count the birds using the wetland. If the wetland includes deep water habitat that can not be assessed with binoculars, then a scope and tripod are necessary. If this is the case, establish as many lookout posts as necessary from key vantage points to collect the data. Depending on the size of the open water, more time may be spent viewing the mitigation area from these vantage points than is spent walking the peripheries of more shallow-water wetlands.

Sites that cannot be circumambulated.

These types of sites will include large-bodied waters, such as reservoirs, particularly those with deep water habitat (>6 ft) close to the shore and no wetland development in that area of the shoreline. If one area of the reservoir was graded in such a way to create or enhance the development of a wetland, then that will be the area in which the ambulatory bird survey is conducted. The team member must then determine the length of the shoreline that will be surveyed during each visit.

As stated above in the ambulatory site section, these large sites most likely will have to be surveyed from established vantage points.

Species Use within the Mitigation Wetland: Data Recording

Result: A complete list of bird species using the site, an estimate of bird densities and associated behaviors, and identification of habitat use.

1. Bird Species List

Record the bird species on the Bird Survey - Field Data Sheet using the appropriate 4-letter code of the common name. The coding uses the first two letters of the first two words of the birds' common name or if one name, the first four (4) letters. For example, mourning dove is coded MODO and mallard is MALL. If an unknown individual is observed, use the following protocol and define your abbreviation at the bottom of the field data sheet: unknown shorebird: UNSB; unknown brown bird (UNBR); unknown warbler (UNWA); unknown waterfowl (UNWF). For a flyover of a flock of unknown species, use a term that describes the birds' general characteristics and include the approximate flock size in parentheses; do not fill in the habitat column. For example, a flock of black, medium-sized birds could be coded: UNBB / FO (25). You may also note on the data sheet if that particular individual is using a constructed nest box.

2. Bird Density

In the office, sum the Bird Survey – Field Data Sheet data by species and by behavior. Record this data in the Bird Summary Table.

3. Bird Behavior

Bird behavior must be identified by what is known. When a species is simply observed, the behavior that it is immediately exhibiting is what is recorded. Only behaviors that have discreet descriptive terms should be used. The following terms are recommended: breeding pair individual (BP); foraging (F); flyover (FO); loafing (L; e.g. sleeping, roosting, floating with head tucked under wing are loafing behaviors); and, nesting (N). If more behaviors are observed that do have a specific descriptive word, use them and we will add it to the protocol; descriptive words or phrases such as “migrating” or “living on site” are unknown behaviors.

4. Bird Species Habitat Use

We are interested in what bird species are using which particular habitat within the mitigation wetlands. This data is easily collected by simply recording what habitat the species was initially observed. Use the following broad category habitat classifications: aquatic bed (AB - rooted floating, floating-leaved, or submergent vegetation); forested (FO); marsh (MA – cattail, bulrush, emergent vegetation, etc. with surface water); open water (OW – primarily unvegetated); scrub-shrub (SS); and upland buffer (UP); wet meadow (WM – sedges, rushes, grasses with little to no surface water). If other categories are observed onsite that are not suggested here, we will make a new category next year.

AQUATIC INVERTEBRATE SAMPLING PROTOCOL

Equipment List

- D-frame sampling net with 1 mm mesh. Wildco is a good source of these.
- Spare net.
- 1-liter plastic sample jars, wide-mouth. VWR has these: catalog #36319-707.
- 95% ethanol: Northwest Scientific in Billings carries this.

All these other things are generally available at hardware or sporting goods stores. Make the labels on an ink jet printer preferably.

- hip waders.
- pre-printed sample labels (printed on Rite-in-the-Rain or other coated paper, two labels per sample).
- pencil.
- plastic pail (3 or 5 gallon).
- large tea strainer or framed screen.
- towel.
- tape for affixing label to jar.
- cooler with ice for sample storage.

Site Selection

Select the sampling site with these considerations in mind:

- Select a site accessible with hip waders. If substrates are too soft, lay a wide board down to walk on.
- Determine a location that is representative of the overall condition of the wetland.

Sampling

Wetland invertebrates inhabit the substrate, the water column, the stems and leaves of aquatic vegetation, and the water surface. Your goal is to sweep the collecting net through each of these habitat types, and then to combine the resulting samples into the 1-liter sample jar.

Dip out about a gallon of water into the pail. Pour about a cup of ethanol into the sample jar. Fill out the top half of the sample labels, using pencil, since ink will dissolve in the ethanol.

Ideally, you can sample a swath of water column from near-shore outward to a depth of approximately 3 feet with a long sweep of the net, keeping the net at about half the depth of the water throughout the sweep. Sweep the water surface as well. Pull the net through a vegetated area, beneath the water surface, for at least a meter of distance.

Sample the substrate by pulling the net along the bottom, bumping it against the substrate several times as you pull.

This step is optional, but it gives you a chance to see that you've collected some invertebrates. Rinse the net out into the bucket, and look for insects, crustaceans, etc. If necessary, repeat the sampling process in a nearby location, and add the net contents to the bucket. Remember to sample all four environments.

Sieve the contents of the bucket through the straining device and pour or carefully scrape the contents of the strainer into the sample jar.

If you skip the bucket-and-sieve steps, simply lift handfuls of material out of the sampling net into the jars. In either case, please include some muck or mud and some vegetation in the jar. Often, you will have collected a large amount of vegetable material. If this is the case, lift out handfuls of material from the sieve into the jar, until the jar is about half full. Please limit material you include in the sample, so that there is only a single jar for each sample.

Top off the sample jar with enough ethanol to cover all the material in the jar. Leave as little headroom as possible.

It is not necessary to sample habitats in any specified order. Keep in mind that disturbing the habitats prior to sampling will chase off the animals you are trying to capture.

Complete the sample labels. Place one label inside the sample jar and tape the other label securely to the outside of the jar. Dry the jar before attaching the outer label if necessary. In some situations, it may be necessary to collect more than one sample at a site. If you take multiple samples from the same site, clearly indicate this by using individual sample numbers, along with the total number of samples collected at the site (e.g. Sample #3 of 5 total samples).

Photograph the sampled site.

Sample Handling/Shipping

- In the field, keep collected samples cool by storing them in a cooler. Only a small amount of ice is necessary.
- Inventory all samples, preparing a list of all sites and enumerating all samples, before shipping or delivering to the laboratory.
- Deliver samples to Rhithron.

GPS Mapping and Aerial Photo Referencing Procedure

The wetland boundaries, photograph location points and sampling locations were field located with mapping grade Trimble Geo III GPS units. The data was collected with a minimum of three positions per feature using Course/Acquisition code. The collected data was then transferred to a PC and differentially corrected to the nearest operating Community Base Station. The corrected data was then exported to ACAD drawings in Montana State Plain Coordinates NAD 83 international feet.

The GPS positions collected and processed had a 68% accuracy of 7 feet except in isolated areas of Tasks .008 and .011, where it went to 12 feet. This is within the 1 to 5 meter range listed as the expected accuracy of the mapping grade Trimble GPS.

Aerial reference points were used to position the aerial photographs. This positioning did not remove the distortion inherent in all photos; this imagery is to be used as a visual aide only. The located wetland boundaries were given a final review by the wetland biologist and adjustments were made if necessary.

Any relationship of features located to easement or property lines are not to be construed from these figures. These relationships can only be determined with a survey by a licensed surveyor.